USDA United States Department of Agriculture Forest Service

FOREST HEALTH ADVISORY SYSTEM FHAAST

U.S. Fish & Wildlife Service

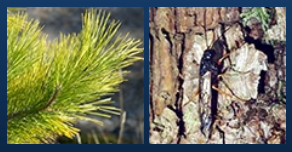
Patuxent Research Refuge Forest Health Advisory

Dutch elm disease

Beech bark disease

Oak decline and gypsy moth

Southern pine beetle


Sirex woodwasp

Engraver beetles (Ips spp.)

Background

America's forests provide ecological, social, and economic services to our Nation. An important aspect of maintaining and enhancing a healthy forest is to protect and restore forests from insects and diseases that cause high levels of tree decline and mortality.

The US Forest Service conducted the **2013-2027 National Insect and Disease Forest Risk Assessment** to provide a nationwide summary of the potential susceptibility to tree mortality caused by major forest pests. Results for the Patuxent Research Refuge are presented below to inform assessments of natural ecosystems and prioritize potential management for pest prevention, suppression, and restoration.

Since 2012, major tree mortality events from forest pest outbreaks, fire, and broad scale forest harvesting operations have reduced or in some cases eliminated risk*. To account for this, areas where significant tree mortality events have occurred have been removed. These areas are represented in the map below as 'Disturbances/treatments in risk areas'. However, many areas still remain highly susceptible to future mortality - 'Remaining Risk' in the map below. A major tree mortality event was defined as one or more of the following:

- Areas depicted as forest cover loss in the University of Maryland Global Forest Change dataset.
- Three or more years of mortality mapped in aerial detection surveys (ADS; Insect and Disease Survey database).
- In the Eastern U.S. only, three or more consecutive years of defoliation mapped in ADS.

Note: The 2018 update does not account for increases in risk due to recent tree growth and density, which can make additional trees susceptible and vulnerable to new forest pest attacks.

This advisory is designed to raise awareness about forest health concerns and provide common ground for consultation between resource managers and forest health specialists. Impacts summarized below assume ***no active management*** during a 15-year (2013-2027) time frame.

*Risk, or more appropriately termed hazard, is defined as the expectation that, without remediation, at least 25% of standing live basal area greater than one inch in diameter will die over a 15-year time frame (2013 to 2027) due to insects and diseases.

What is at Risk and What are the Threats for Patuxent Research Refuge?

Within Patuxent Research Refuge, 71 acres are susceptible to high levels (≥25%) of overall tree mortality, and 5% of the tree biomass is at risk to forest pests. Accounting for major forest disturbances, such as insect and disease outbreaks, fires, and treatments, the number of susceptible acres has not significantly changed.

Impacts to Host Tree Species

Host Tree Species	Loss, % of Host	Loss, % of All Trees
American Elm	30%	<1%
American Beech	28%	<1%
Shortleaf Pine	18%	<1%
White Oaks	17%	1%
Virginia Pine	17%	4%
Red Oaks	13%	<1%

Tree Atlas Species Composition

Tree Species	Prevalence, % of All Trees
Virginia Pine	36%
Red Maple	19%
Sweetgum	11%
Scarlet Oak	9%
White Oak	9%
Yellow-Poplar	2%
Pin Oak	2%
Blackgum	2%
Black Oak	1%

Note: only up to 9 of the most prevalent Tree Atlas species are listed.

Impacts by Forest Pest

Forest Pest	Loss, % of Host	Loss, % of All Trees
Dutch Elm Disease	31%	<1%
Beech Bark Disease	28%	<1%
Oak Decline and Gypsy Moth	15%	1%
Southern Pine Beetle	11%	3%
Sirex Woodwasp	3%	1%
Engraver Beetles (Ips spp.)	2%	<1%
ALL FOREST PESTS		**5%**

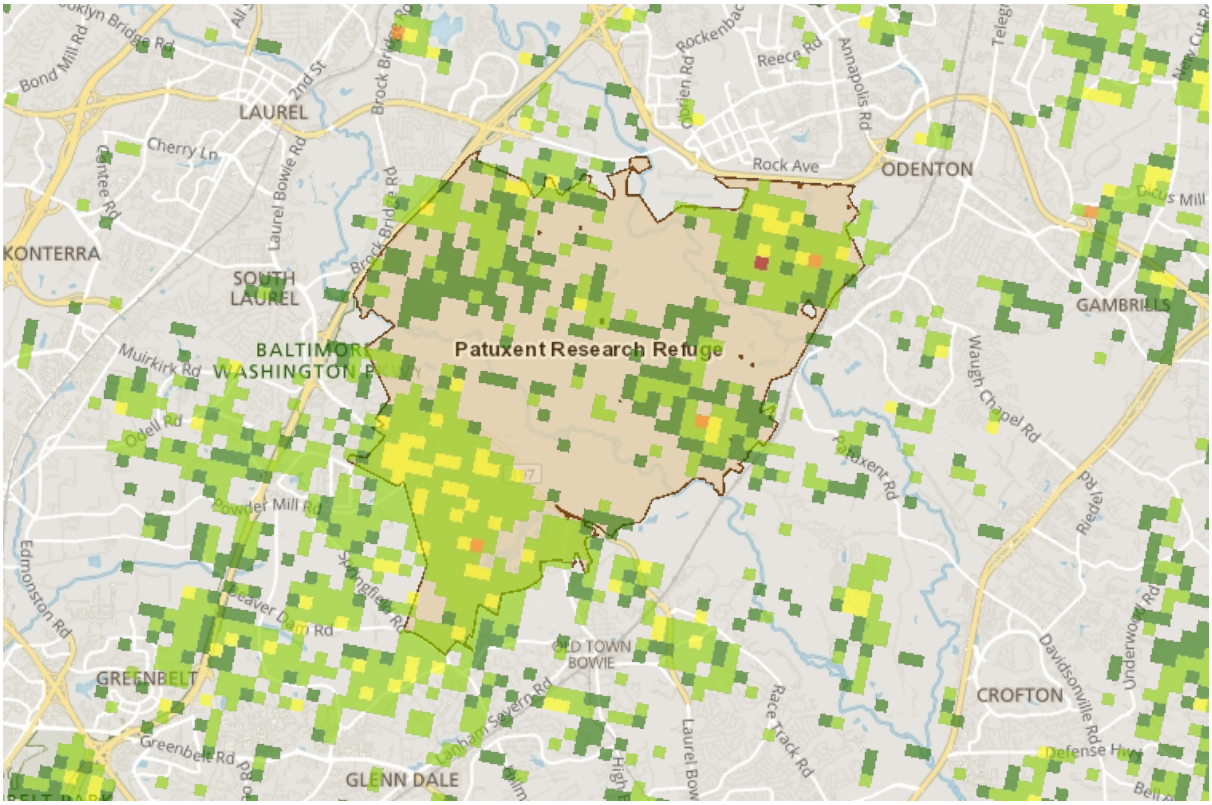
Forest Pest/Host Combinations

Forest Pest	Host Tree Species
Engraver Beetles (Ips spp.)	Shortleaf pine, Virginia pine
Southern Pine Beetle	Shortleaf pine, Virginia pine
Sirex Woodwasp	Shortleaf pine, Virginia pine
Beech Bark Disease	American beech
Oak Decline and Gypsy Moth	Red oak spp., white oak spp.
Dutch Elm Disease	American elm

Note: percentages in all tables are based on basal area. ***Basal area*** (or biomass) is the cross-sectional area of trees measured 4.5 feet above the ground.

Pest Maps

Composite Pest Risk: Loss, % of All Trees



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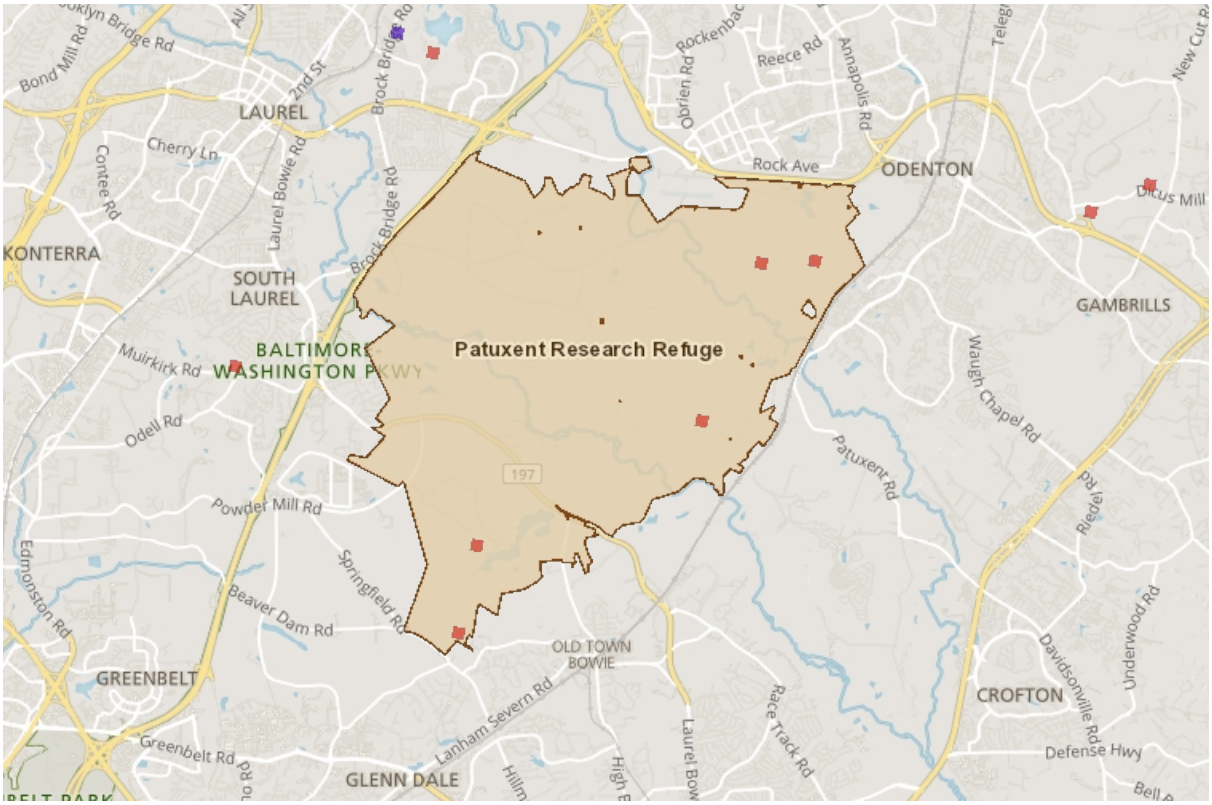
Composite Pest Risk

% of Total BA Loss

- 1 - 5% BA loss from all pests
- 6 - 15%
- 16 - 24%
- 25 - 35%
- > 35% projected BA loss

Composite Pest Risk: NIDRM 2018 Update



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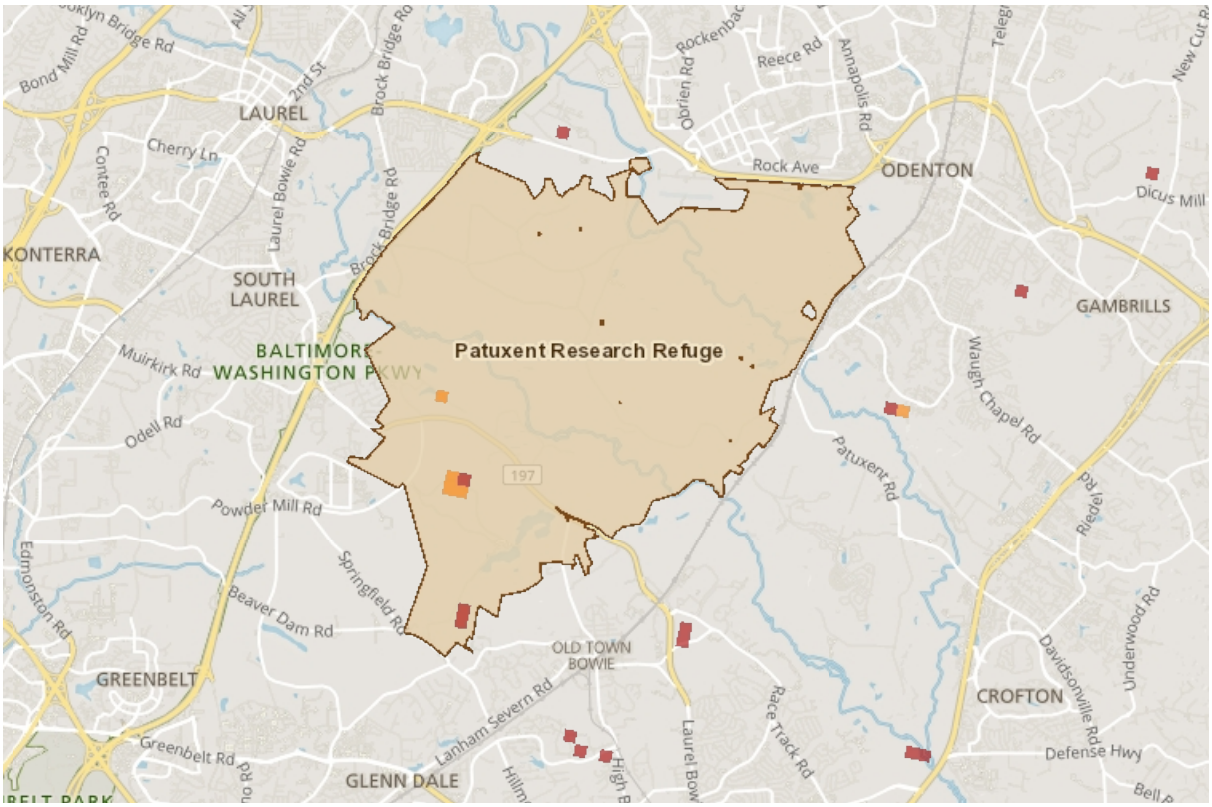
Composite Pest Risk

NIDRM 2018 Update

- Recent Disturbance in Risk Area
- Remaining Risk

Dutch Elm Disease: Loss, % of Host



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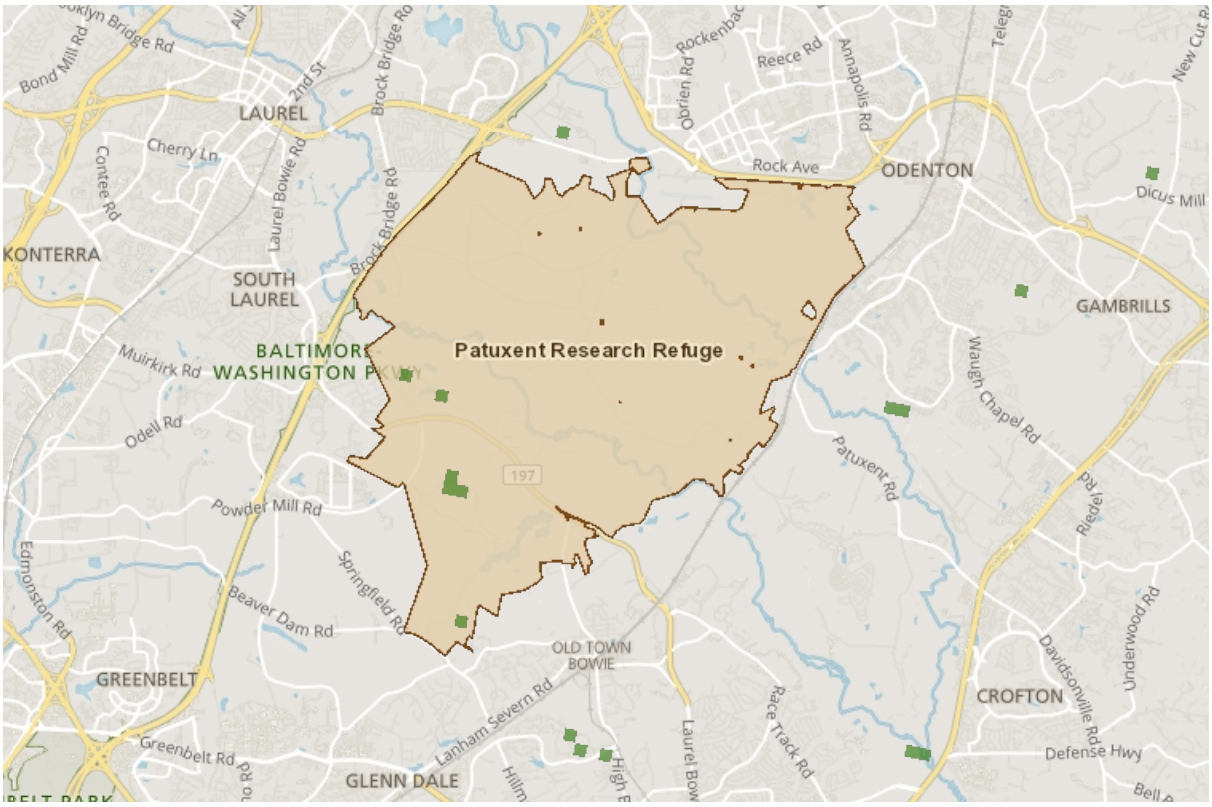
Dutch Elm Disease

% of Host BA Loss

- 1 - 10% of Host BA loss from pest
- 11 - 15%
- 16 - 20%
- 21 - 30%
- >30% projected Host BA loss

Dutch Elm Disease: Loss, % of All Trees



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Dutch Elm Disease

% of Total BA Loss

- 1 - 5% of Total BA loss from pest
- 6 - 10%
- 11 - 15%
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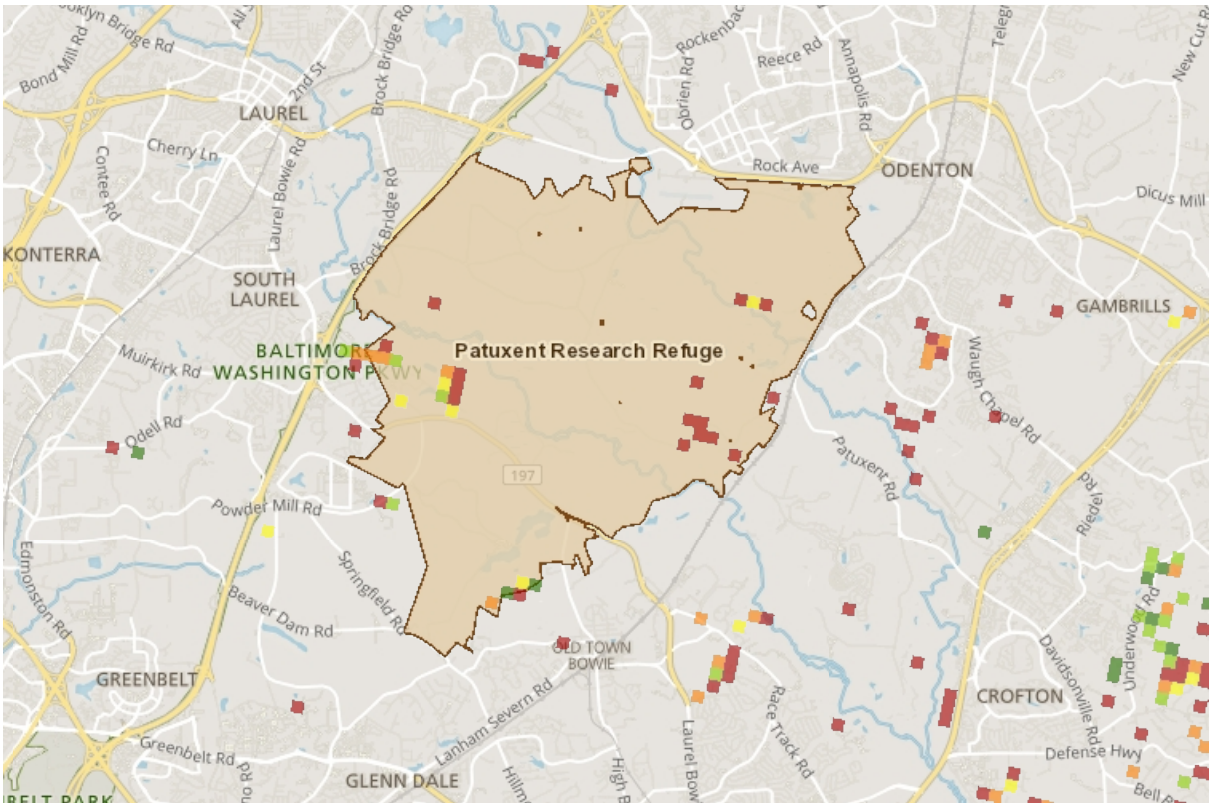
- > 20% projected Total BA loss

Beech Bark Disease: Loss, % of Host



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Beech Bark Disease

% of Host BA Loss

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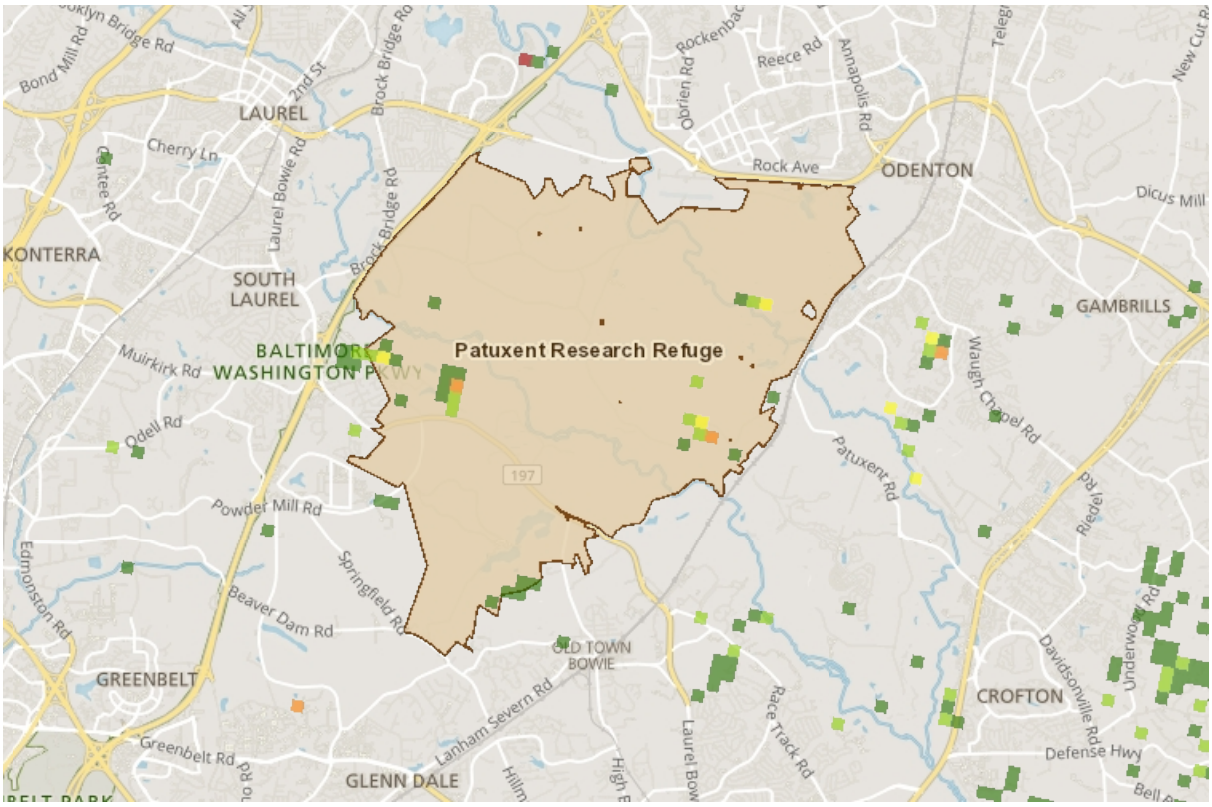
Beech Bark Disease: Loss, % of All Trees



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Beech Bark Disease

% of Total BA Loss

- 1 - 5% of Total BA loss from pest
- 6 - 10%
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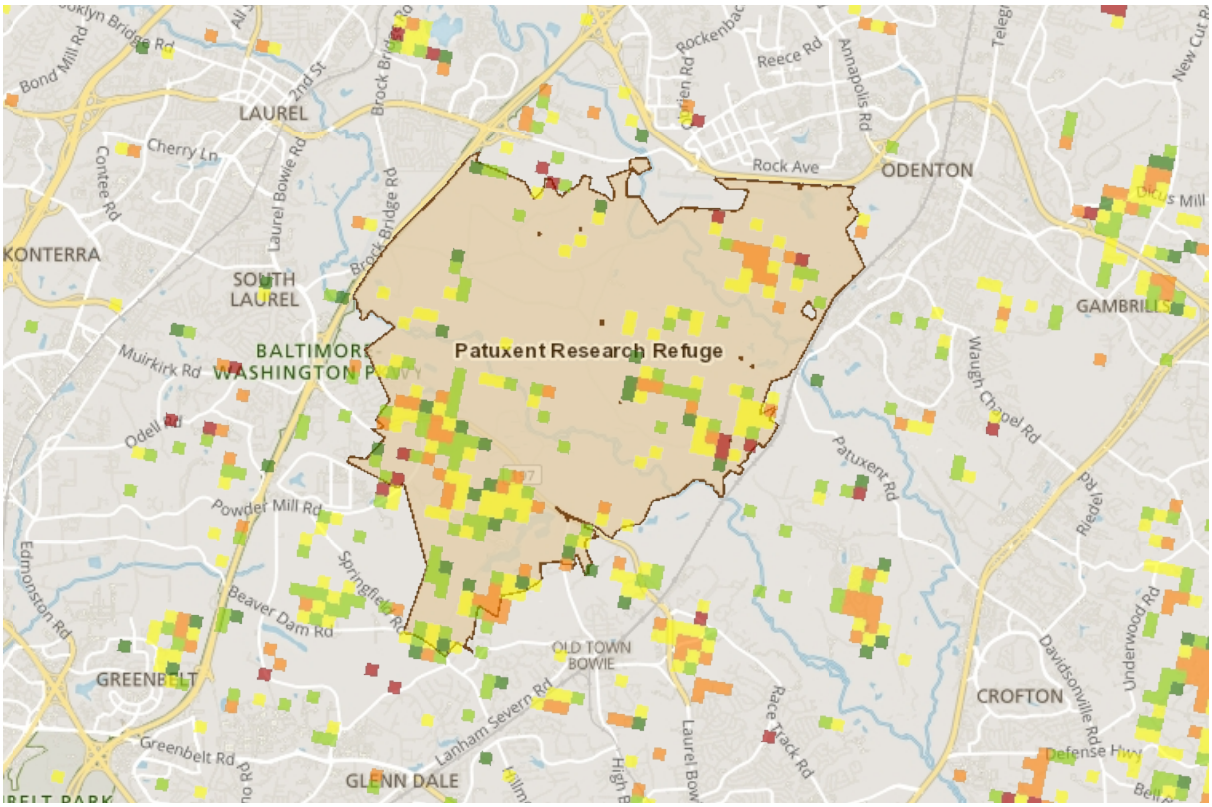
- 16 - 20%
- > 20% projected Total BA loss

Oak Decline and Gypsy Moth: Loss, % of Host



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Oak Decline and Gypsy Moth

% of Host BA Loss

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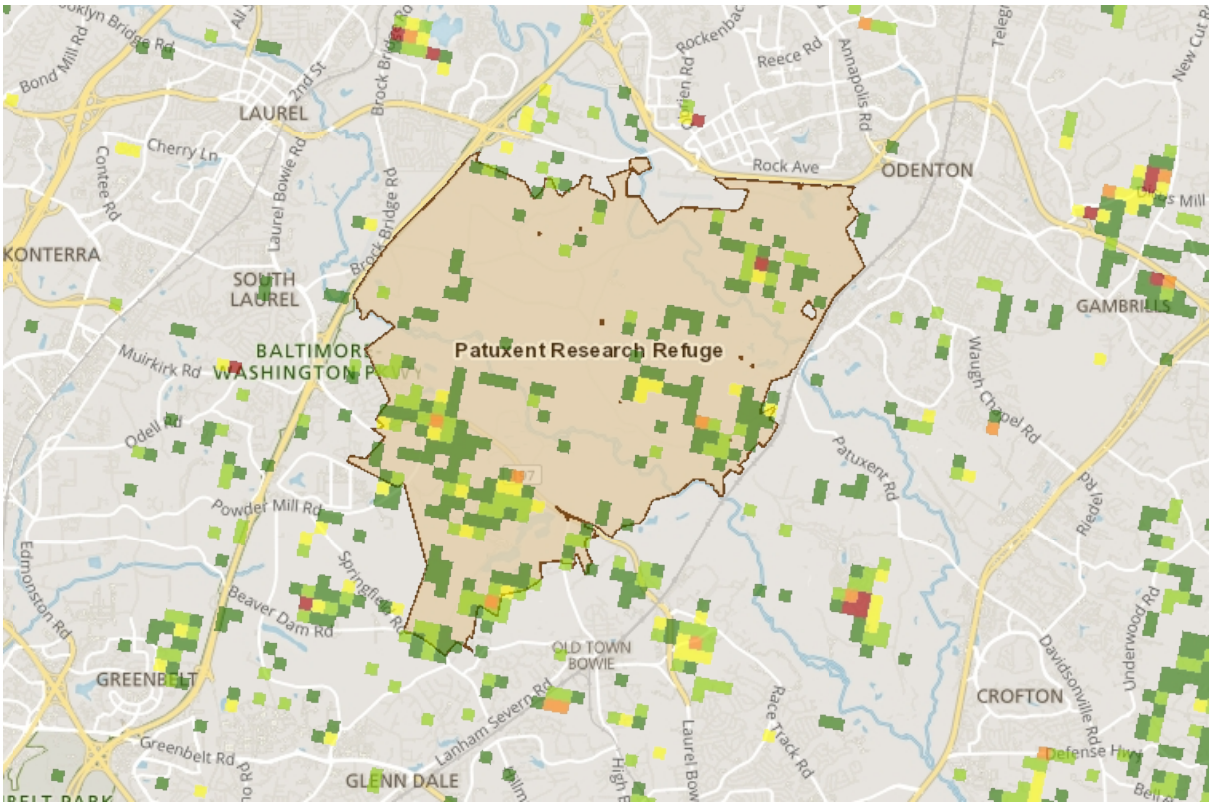
Oak Decline and Gypsy Moth: Loss, % of All Trees



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Oak Decline and Gypsy Moth

% of Total BA Loss

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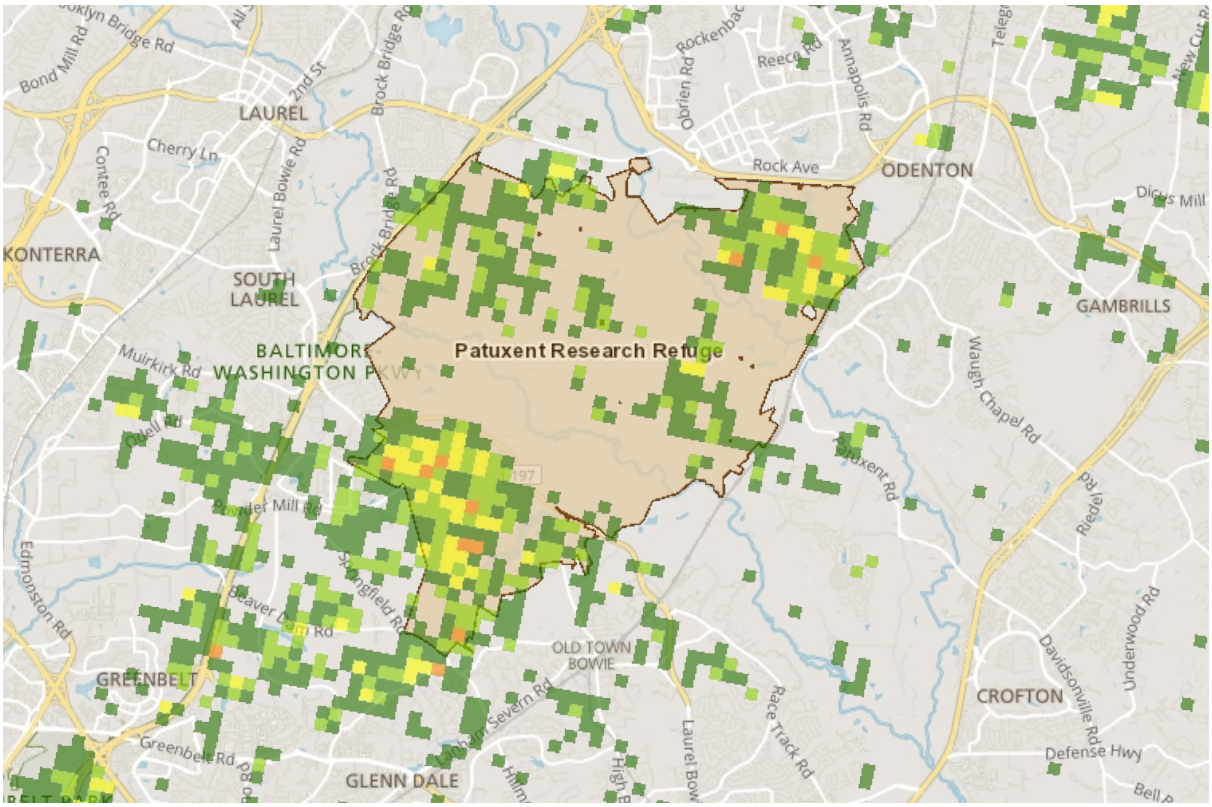
Southern Pine Beetle: Loss, % of Host



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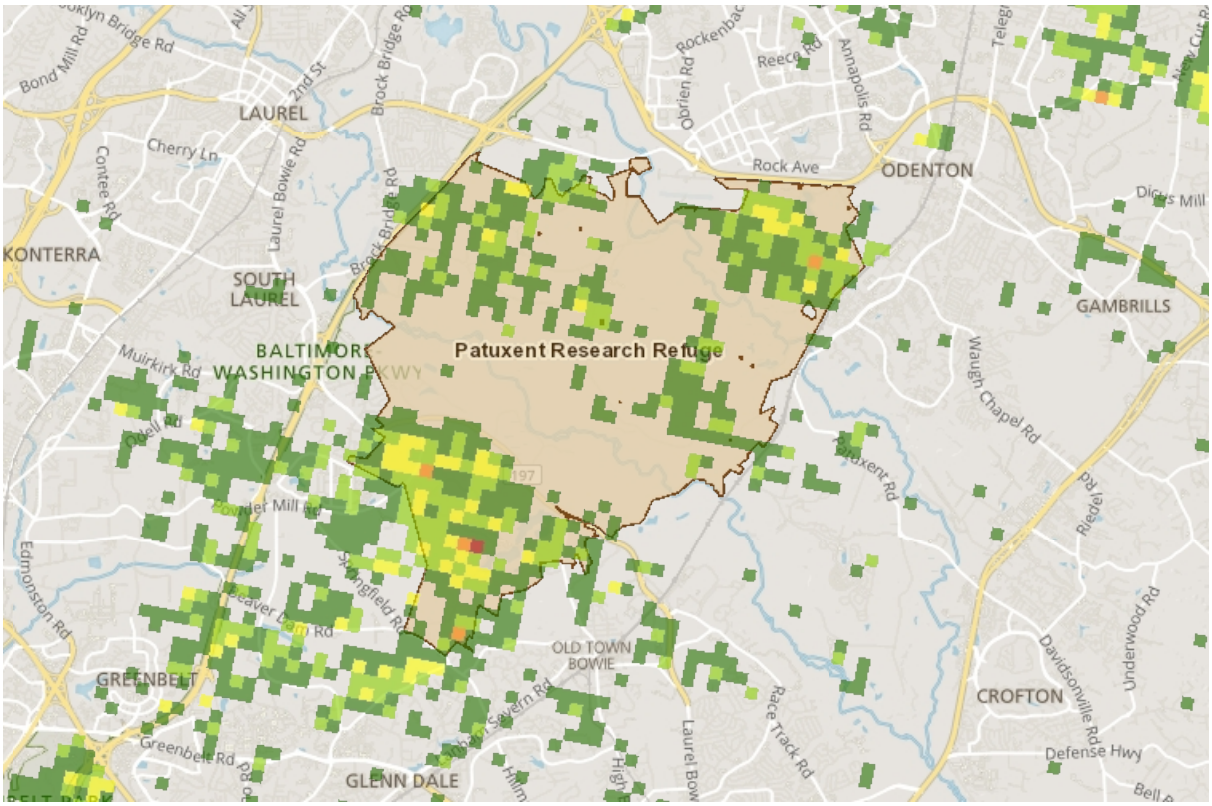
Southern Pine Beetle

% of Host BA Loss

- 1 - 10% of Host BA loss from pest
- 11 - 15%
- 16 - 20%
- 21 - 30%
- >30% projected Host BA loss

Southern Pine Beetle: Loss, % of All Trees



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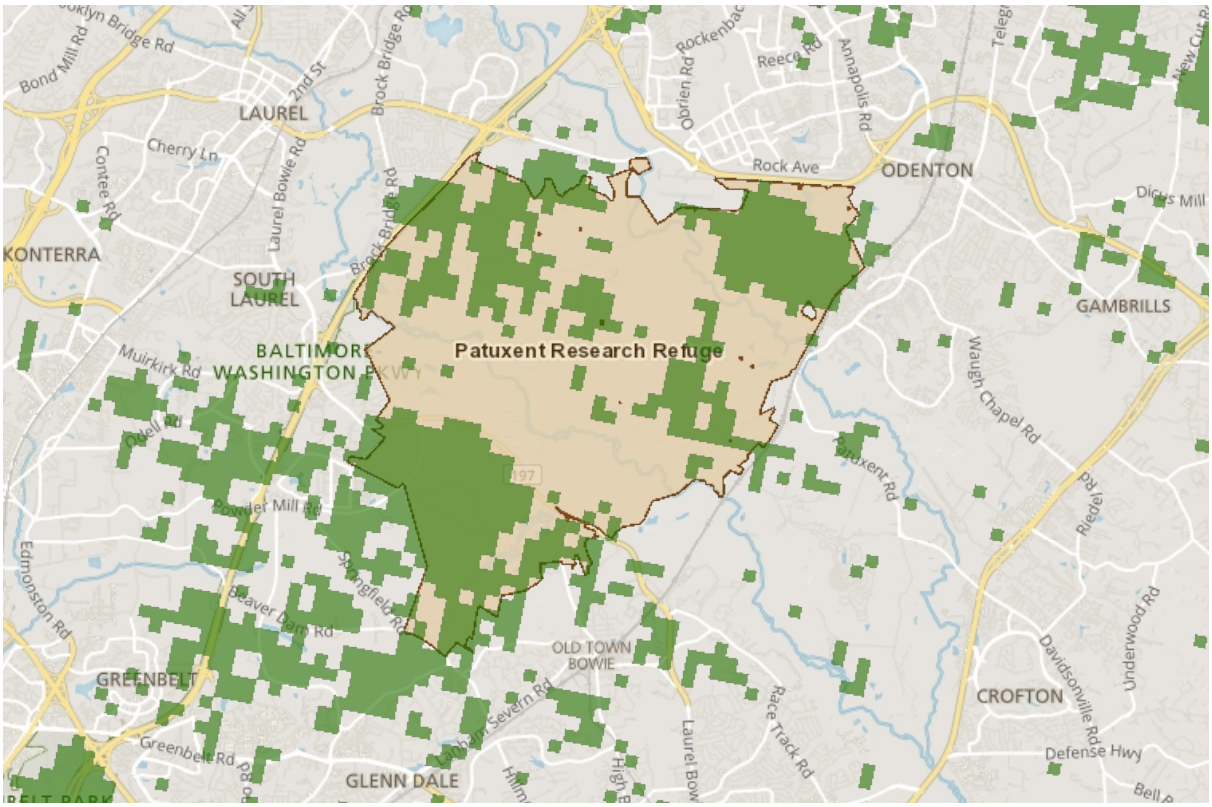
Southern Pine Beetle

% of Total BA Loss

- 1 - 5% of Total BA loss from pest
- 6 - 10%
- 11 - 15%
- 16 - 20%
- > 20% projected Total BA loss

Sirex Woodwasp: Loss, % of Host



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Sirex Woodwasp

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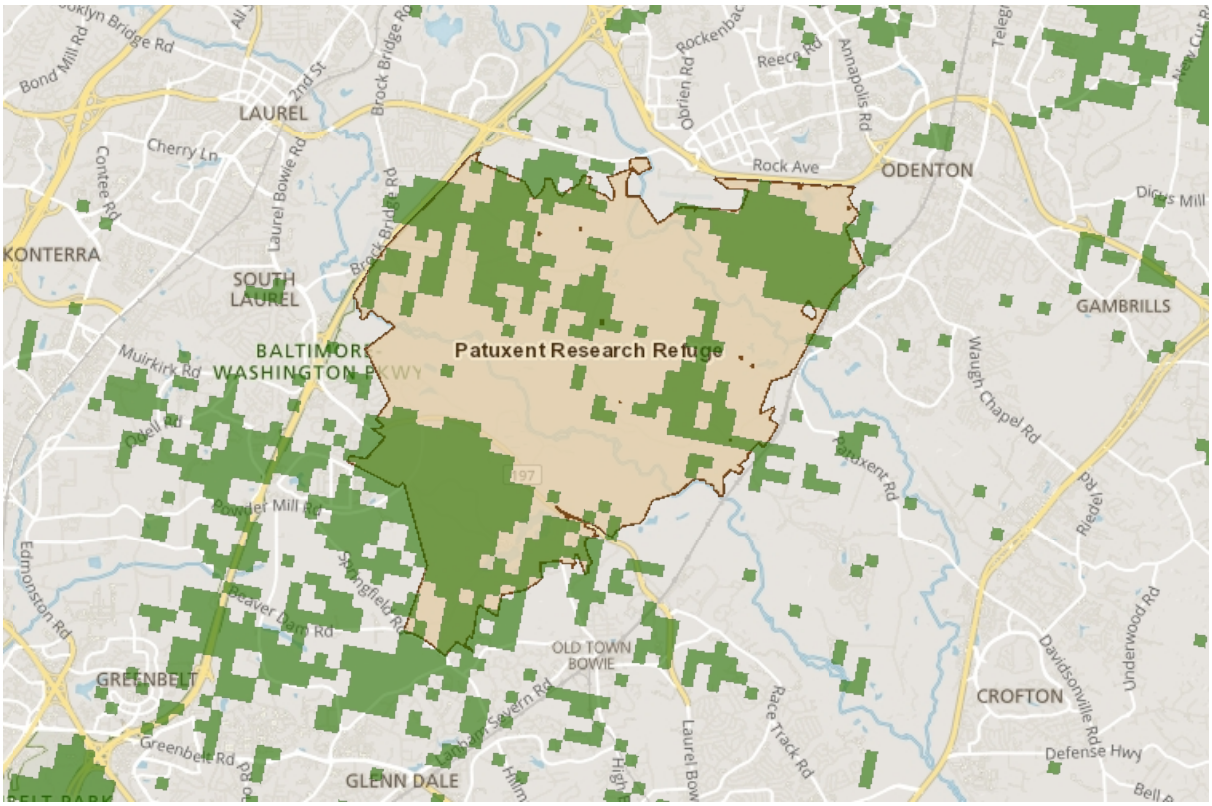
Sirex Woodwasp: Loss, % of All Trees



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Sirex Woodwasp

% of Total BA Loss

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- 6 - 10%
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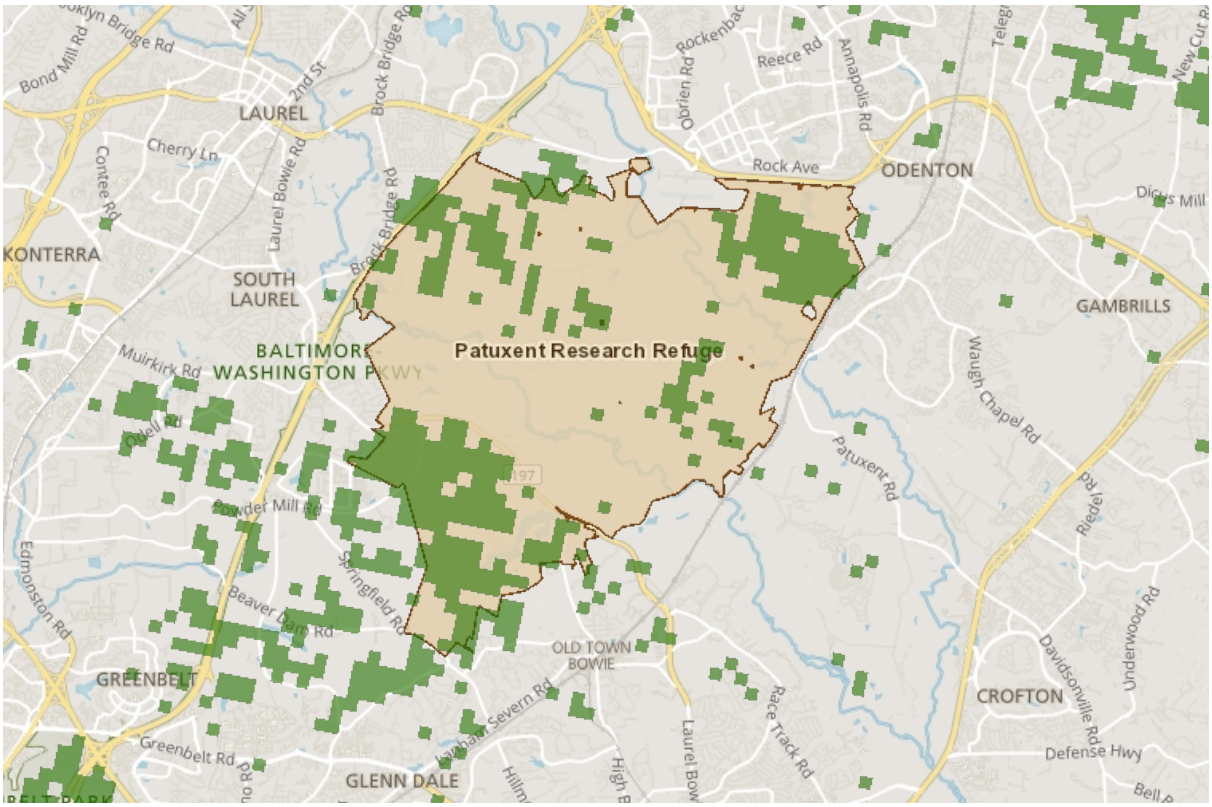
Engraver Beetles (Ips spp.): Loss, % of Host



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Engraver Beetles (Ips spp.)

% of Host BA Loss

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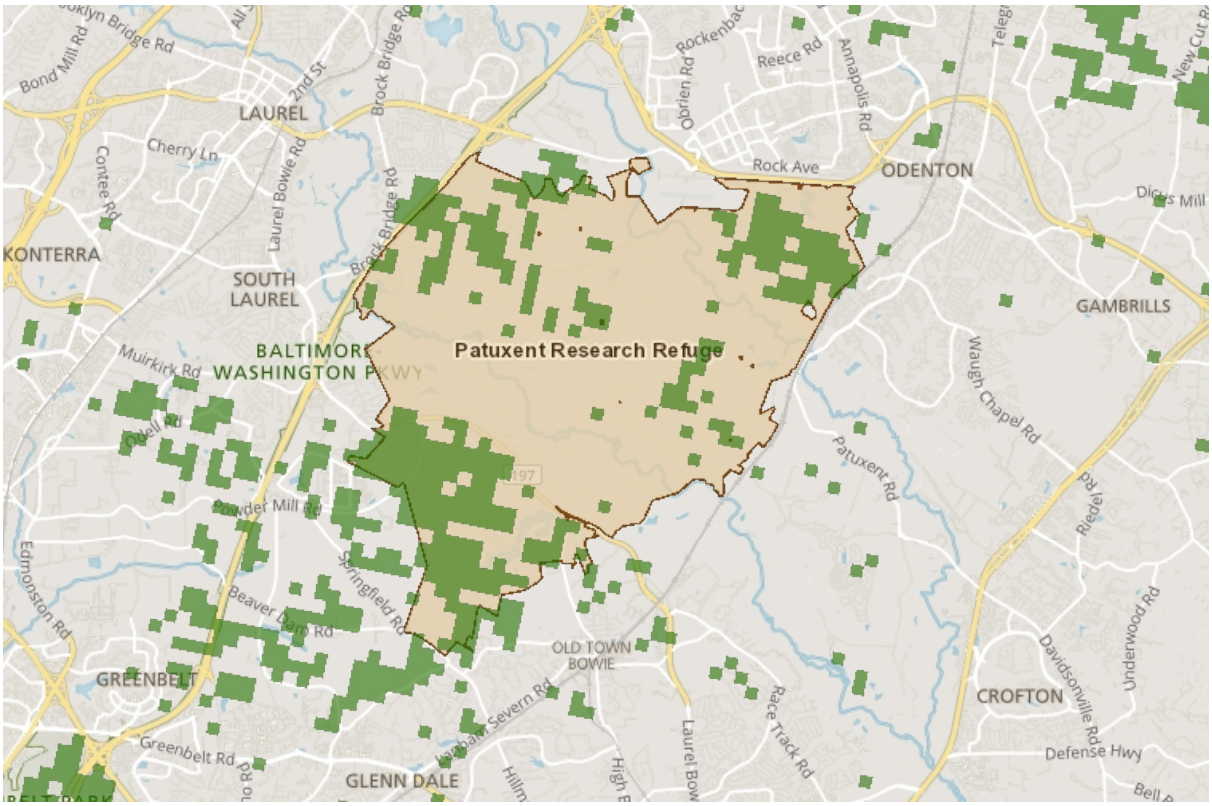
Engraver Beetles (Ips spp.): Loss, % of All Trees



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Engraver Beetles (Ips spp.)

% of Total BA Loss

- 1 - 5% of Total BA loss from pest
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Comparative Layer Maps

Insect and Disease Survey Points (last 5 years)

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Insect and Disease Survey Points (last 5 years)

- Mortality
- Other Damage
- Defoliation

Insect and Disease Survey Polygons (last 5 years)

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Insect and Disease Survey Polygons (last 5 years)

- Mortality
- Defoliation
- Other Damage

Silviculture Timber Stand Improvement (2011- Current)

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Silviculture Timber Stand Improvement (2011- Current)

Silviculture Reforestation (2011 - Current)

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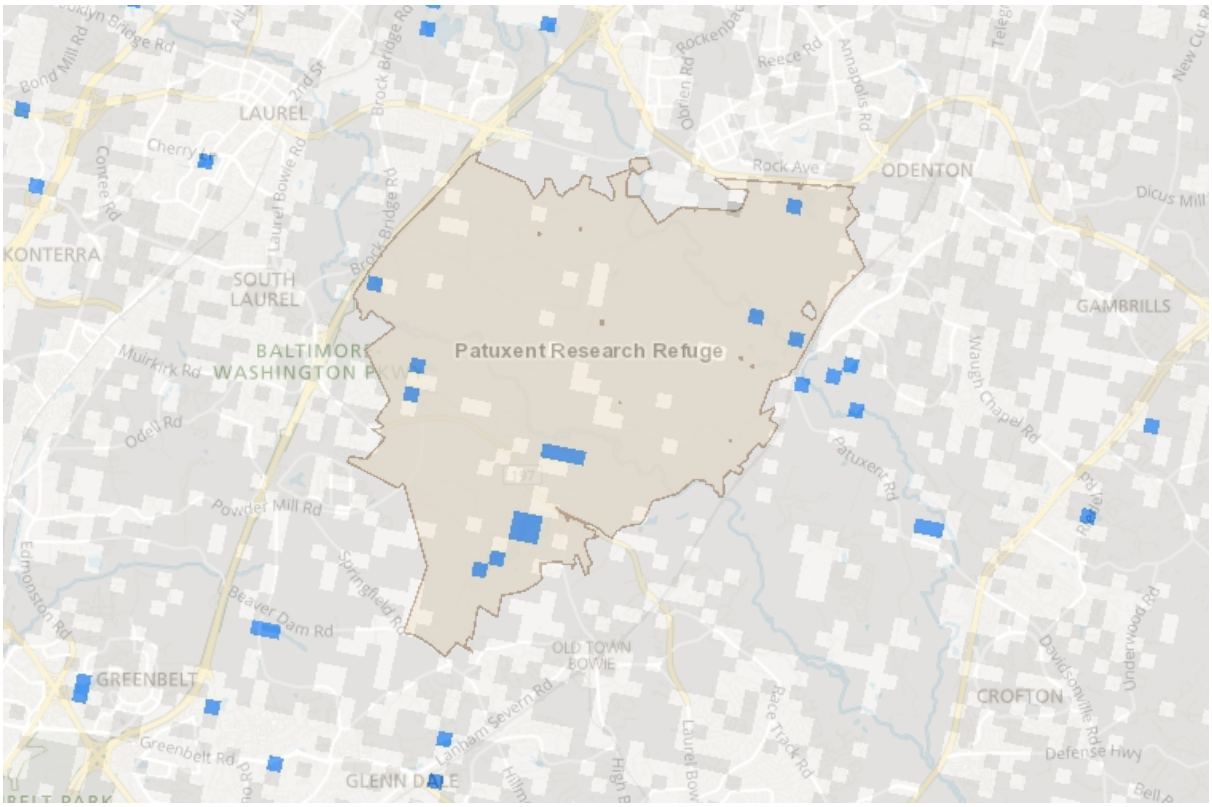
Silviculture Reforestation (2011 - Current)

Wildfire Hazard Potential 2014



Potential Management Strategies & Key Contacts

IMPORTANT : The following potential management strategy options are generalized for a wide range of conditions and are not meant to provide specific prescriptions, but instead an introduction to a range of management options. Forest treatments for tree killing insects and diseases are just one aspect of forest management. Site-specific recommendations should be determined by Forest health and other land management specialists during field visits.

Potential Pest Management Strategies – Depending on Local Management Objectives

STRATEGY	Beech Bark Disease	Dutch Elm Disease	Engraver Beetles (Ips spp.)	Oak Decline and Gypsy Moth	Sirex Woodwasp	Southern Pine Beetle
Detection & Monitoring - Can prevent a pest from increasing to damaging levels and reduce tree mortality, when early detection is followed by a rapid response						
Monitor for population fluctuation, establishment, range expansion - traps, aerial/ground survey	x	x	x	x	x	x
Prevention - Making forests more resilient and reducing pest hazard						
Increase species diversity - planting, seeding, tree removal, etc.	x	x	x	x		x
Limit movement of firewood	x	x	x	x		
Manage age class/stand structure, Increase age class diversity - planting, tree removal, etc.		x	x	x	x	x
Preventive pesticide treatments		x				
Reduce susceptible species and unhealthy trees	x	x	x		x	x

Potential Pest Management Strategies – Depending on Local Management Objectives

STRATEGY	Beech Bark Disease	Dutch Elm Disease	Engraver Beetles (Ips spp.)	Oak Decline and Gypsy Moth	Sirex Woodwasp	Southern Pine Beetle
Reduce stand basal area to increase vigor of remaining trees - preventive thinning, prescribed burning, etc. (timing can be critical to reduce and not exacerbate pest threat)			x		x	x
Restoration - Re-establishing processes necessary to facilitate forest sustainability, resilience, and health						
Genetic improvement and conservation	x	x				
Reforestation - replant existing or alternative native species or silvicultural systems that promote natural regeneration	x	x	x	x	x	x
Salvage and dead (hazard) tree removal	x	x	x	x	x	x
Prescribed burning						x
Suppression - Reduce the overall damage to forest resources from outbreaks of insect and disease-causing pests						
Pesticide and biocontrol application	x	x	x	x	x	x
Sanitation - removing, cutting and treating/pruning infested trees/ remove/treat blow down or slash	x	x	x		x	x
Semiochemicals/Trap trees			x			x

Key Contacts: To learn more about forest pests and options for their management, please contact your local forest health expert.

More Information on Current Pest Conditions & Risk Assessments

Current range & conditions for most pests

2013 - 2017 National Insect & Disease Risk Assessment Report and GIS Data Downloads